REMARKS

The Applicants hereby submit this Request for Reconsideration in response to the Office Action mailed on 05 April 2007. In the present Request for Reconsideration, no claims have been amended, added, or canceled. Therefore, claims 1-2, 4, 6, 8-16, 18, and 21-30 are pending for further examination.

In the Office Action of 05 April 2007, the Examiner maintained the rejection of claims of the present application under 35 U.S.C. Sect. 103(a) as being unpatentable over U.S. Patent No. 6,315,875 to Sasaki (hereinafter "Sasaki") in view of U.S. Patent Application Publication US 2004/0027730 to Lille (hereinafter "Lille"). In response, the Applicants respectfully submit that all pending claims of the present application are allowable over the prior art of record for at least the following reasons.

PERTINENT STANDARDS. For an appropriate 35 U.S.C. Sect. 103(a) rejection, the prior art (alone or in combination) must teach or suggest each and every limitation in the claims. In addition, there must be a proper obviousness/non-obviousness assessment that includes some adequate reasoning and/or demonstration that one ordinarily skilled in the art would have combined the teachings of the references to produce that which is claimed.

When considering various prior art teachings for an obviousness/non-obviousness determination under §103,

> the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background the obviousness or non-obviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. *Graham vs. John Deere Co. of Kansas City*, 383 U.S. 1, pp 17-18 (1966).

In this analysis, a functional approach may be taken which asks whether the improvement of the presented invention is more than a predictable use of prior art elements according to their established functions. It is also helpful and instructive to consider whether there is any teaching, suggestion, or motivation to combine the teachings of the references, either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art, in a flexible and non-rigid manner. The reason or evidence of a motivation to combine teachings need not be found explicitly in the prior art references, as one may also "look to interrelated teachings of multiple patents; the effects of demands know to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art." *KSR Int'l Co. v. Teleflex Inc. et al.*, 127 S.Ct. 1727, at 1740-41.

CLAIM LIMITATIONS. As stated previously, the claims recite that the protective layer utilized in the present invention is a *chemical-mechanical polishing (CMP) protective layer*. This layer is different from a protective capping layer of tantalum (e.g. see Sasaki). A capping layer of tantalum does not provide a suitable barrier to a CMP pad during a CMP lift-off process. If it did, for example, no CMP protective layer (e.g. carbon) would ever be needed to protect the read sensor from the CMP pad. To construe the terminology "CMP protective layer" any differently so as to be or include a capping layer of tantalum, would be to construe the terminology in an unreasonable manner to one ordinarily skilled in the art.

In connection with this terminology, the claims of the present application recite related processes which include:

> performing a reactive ion etching (RIE) to remove end portions of the CMP protective layer in end regions which surround the central region without removing any of the read sensor layers, to thereby leave

intact both a central protective portion of the CMP protective layer underneath the first photoresist structure and the read sensor layers;

after performing the RIE and leaving the read sensor layers intact, performing an ion milling of the read sensor layers such that end portions of the read sensor layers are removed in the end regions and a central sensor portion remains underneath the first photoresist structure, to thereby define a stripe height for the read sensor

ARGUMENTS. The Applicants respectfully submit that no adequate reasoning or demonstration of obviousness has been made with respect to the present claims, for demonstrating that one of ordinary skill in the art would have combined the teachings of the prior art references to produce that which is claimed.

THE EXAMINER'S PROPOSED REASONING FOR MODIFYING THE TEACHINGS OF SASAKI FAIL.

1. In the rejection of claims, the Examiner states the following:

Sasaki does not expressly teach that the protective layer is a CMP protective layer that provides a suitable physical barrier to protect the read sensors from the CMP pad.

Lille teaches that the first protective layer 908 can be made of a CMP protective material. (Paragraph 53)

It would have been obvious to one of ordinary skill in the art to modify the protective layer taught by Sasaki to form it of a CMP protective material, as taught by Lille. The motivation for doing so, as taught by Lille (Paragraph 53), would have been to help prevent mechanical dishing into the read sensor when the resist is removed by CMP.

As indicated above, to maintain all obviousness rejections, *the Examiner essentially argues that one ordinarily skilled in the art would be inclined to eliminate the top capping layer (e.g. tantalum) of Sasaki and replace it with a chemical-mechanical polishing (CMP) protective layer (e.g. carbon).* In response, the Applicants respectfully

disagree with this proposal. The Applicants respectfully submit that one ordinarily skilled in the art would not be readily inclined to eliminate a top tantalum capping layer from a read sensor of Sasaki for the reasons provided by the Examiner.

Top capping layers made of tantalum for read sensors have been in ubiquitous use in the industry for several years for *protecting* read sensors. Top capping layers may also be carefully designed in read sensors to help maintain good MR coefficients for the read sensors. Thus, top capping layers of tantalum have served these important purposes in read sensors. On the other hand, a chemical-mechanical polishing (CMP) protective layer made of carbon, for example, would not provide the necessary protection equivalent to that of a top capping layer of tantalum.

Clearly, the standard ubiquitous practice of utilizing top capping layers made of tantalum for needed sensor protection would obviously defeat any alternative speculative purpose fashioned by the Examiner to "help prevent mechanical dishing into the read sensor when the resist is removed by CMP."

Therefore, since there is no adequate reasoning and/or demonstration that one ordinarily skilled in the art would have modify the teachings of the references as the Examiner suggests, the subject matter as defined by the claims is non-obvious over the prior art of record. The Applicants respectfully request the Examiner to withdraw all claim rejections and allow the application.

2. Considering the alternative – that the Examiner is arguing that a CMP protective layer of Lille would be utilized *in combination with* the top capping layer of tantalum of Sasaki (which is not argued by the Examiner) – the Examiner's reasoning still fails. If this argumentation were to be utilized, there is no adequate reason why one ordinarily skilled in the art would utilize a RIE in the end regions of the read sensor *without removing any of the read sensor layers* as claimed. Such a step would run counter to the teachings of Sasaki. The reason is that Sasaki emphasizes a first etching step for etching *some of the layers making up the GMR element*. See e.g. the Abstract of

Sasaki. Some of these layers must include at least the top capping layer of tantalum (e.g. see column 11 at line 58 of Sasaki). In contrast, however, in the present claims it is recited that the RIE fails to etch the read sensor layers.

To further illustrate this point, the Examiner previously made the following argument in attempt to demonstrate the §103 rejections:

> "[t]he motivation for making such a modification would have been to better accomplish the goal disclosed by Sasaki of exploiting the differences between the RIE and the ion milling to ensure that the layers underneath the read sensor layers are not damaged when the read sensor layers are removed. Sasaki teaches that performing only RIE would damage the underlying shield gap layer 4a, whereas removing the read sensor layers by ion milling keeps the shield gap layer from being damaged. (Column 12, Lines 11-62) In other words, using the RIE to remove only the protective layer, as taught by Lille, would further insure that the RIE is unable to damage the shield gap layer, as desired by Sasaki.

The Applicants respectfully disagree with the Examiner's above assessment. One of the goals of Sasaki is to prevent the over-etching of read sensor materials with the ion milling process. See e.g. Sasaki at column 3 at lines 66-67 through column 4 at lines 1-10, stating *the problem of conventional techniques*:

> ...over-etching is required to some extent when the layers 105a, 105b, 105c are etched through ion milling. Consequently, as shown in FIG. 22, the very thin first shield gap film 104a having a thickness of 20 to 40 nm may be damaged or etched and holes may be thus formed in the shield gap film 104a. If the conductive layers 106 are formed, as shown in FIG. 23, while the first shield gap film 104a has holes, a short circuit is created between the bottom shield layer 103 and the conductive layers 106. Such a short circuit results in an increase in noise that affects the GMR element 105.

To help overcome this problem, Sasaki initially uses a RIE process to etch at least some of the read sensor layers of the GMR element and subsequently uses an ion milling

process to etch the remaining read sensor layers. In Sasaki, at least some of the read sensor layers etched with the RIE include the free layer of the GMR element (see e.g. 12:14-18: "The first etching is performed to etch some of the layers making up the GMR element 5, that is, a part of the thickness of the layers from the top surface. For example, this etching is performed at least as deep as the free layer 5c"). This way, the time required of the subsequent second etching (i.e. ion milling) is kept short in order to prevent over-etching and damage to the sensor of Sasaki. See e.g. Sasaki at column 12 at lines 48-54:

> The second etching step is performed to etch only some of the layers making up the GMR element 5, instead of etching all of these layers. Therefore, the time required for performing the second etching is short. As a result, very little damage is done to the first shield gap film 4a even through ion milling is performed as the second etching.

This is the solution which Sasaki proposes.

If Sasaki were modified such that only the CMP protective layer which covers the read sensor was removed by RIE, then the undesirable outcome described in relation to columns 3-4 would be practiced. That is, the second etching step of Sasaki (i.e. the ion milling) would be employed to etch through the entire read sensor and cause undesirable sensor damage. As apparent, Sasaki teaches away from such technique. See e.g. *In re Rudko*, Civ. App. No. 98-1505 (Fed. Cir. May 14, 1999). Thus, there is no associated teaching, or adequate suggestion or motivation to combine the teachings of Lille and Sasaki, as suggested by the Examiner.

The Examiner further asserted that the motivation to combine the teachings to result in the present invention would have been to better accomplish the goal disclosed by Sasaki, to exploit the differences between the RIE and the ion milling to ensure that the layers underneath the read sensors are not damaged when the read sensor layers are removed. Certainly, however, for Sasaki to refrain from applying the RIE to any of its

read sensor layers would be to propose techniques which provide the undesirable results of the prior art, according to Sasaki.

Thus, even assuming that a CMP protective layer were formed over the read sensor of Sasaki, and even assuming that a RIE process were used to etch away only this CMP protective layer to leave the remaining read sensor layers of Sasaki intact, then the result would be that the ion milling process is used to mill away all read sensor layers of Sasaki – which would lead to the undesirable read sensor damage. Again, some of these layers which are etched away in Sasaki must include at least the top capping layer of tantalum (e.g. see column 11 at line 58 of Sasaki). In contrast, in the present claims it is recited that the RIE fails to etch the read sensor layers.

Again, the technique of the present disclosure requires a RIE of a CMP protective layer "without removing any of the read sensor layers" ... "to thereby leave intact ... the read sensor layers." An "ion milling" is performed "after performing the RIE and leaving the read sensor layers intact." The prior art alone or in combination fail to teach or suggest the same.

Based on the above, since there is no adequate reasoning and/or demonstration that one ordinarily skilled in the art would have modify the teachings of the references as the Examiner suggests, the subject matter as defined by the claims is non-obvious over the prior art of record. The Applicants respectfully request the Examiner to withdraw all claim rejections and allow the application.

3. In the Office Action of 05 April 2007, the Examiner argues two reasons regarding why the making of the modification of Sasaki does not defeat the objective of Sasaki. The Examiner's *first reason* is that "[e]ven if the first step of the etching method were only used to remove the protection layer (which Sasaki calls part of the GMR element 5), the second step of the etching method would take less time than otherwise, still allowing the goal of Sasaki to be attained" (see page 21 of the Office Action). However, the first Examiner's reason is incorrect because then Sasaki fails to teaching

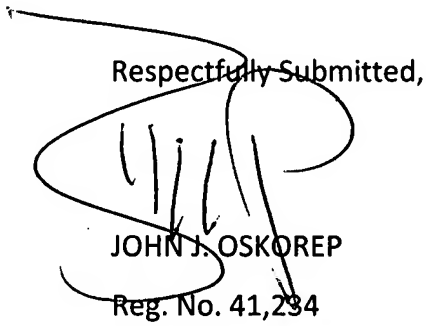
"without removing of the read sensor layers." If a CMP protective layer were added on top of the top tantalum capping layer of Sasaki, then the remaining read sensor layers, which would be left intact for ion milling per the claimed processes, would be all read sensor layers of Sasaki (e.g. including Sasaki's tantalum capping layer), and this would undesirably take the same amount of time (not less time) to be etched.

4. The Examiner's *second reason* regarding why the making of the modification of Sasaki does not defeat the objective of Sasaki is that "[t]he conventional method taught by Sasaki is still a viable, workable process, which Sasaki simply seeks to improve upon" and that "Sasaki does not teach away from the conventional method, but rather teaches a better way" (see page 21 of the Office Action). However, the Examiner's second reason fails because it assumes too much. *Specifically, the rejection of claims made by the Examiner is not based on alternative teachings of conventional techniques stated in column 3 of Sasaki, but rather in relation to the teachings in columns 11, 12, and 13 of Sasaki.* The Examiner even makes admissions that make it clear what the particular basis of the rejections are: "Sasaki does not expressly teach that the RIE is performed without removing any of the read sensor layers" (see e.g. rejection of claim 1 on page 3 of the previous Office Action). In addition, the Examiner assumes that the method described in relation to column 3 of Sasaki ("conventional techniques") is the same as the method described in relation to columns 11-13, except for the RIE process. However, this assumes too much. For example: no part of the stripe height definition is described in relation to column 3 of Sasaki. As apparent, the Examiner cannot mix and match the teachings (i.e. unrelated steps and processes and materials) in Sasaki as desired.

Based on the above, the Applicant submit that all pending claims as amended are allowable over the prior art of record and that the present application is now in a condition suitable for allowance.

Thank you. Please feel free to contact the undersigned if it would expedite the prosecution of the present application.

Respectfully Submitted,



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